

Key

5.3 Parabolas

Name _____ Date _____ Period _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the vertex, focus, directrix, and focal width of the parabola.

1) $x^2 = 6y$

Vertex: $(0, 0)$ Directrix: $y = -3/2$

1) _____

Focus: $(0, 3/2)$ F.W.: 6

2) $(y - 2)^2 = 4(x + 3)$

Vertex: $(-3, 2)$ Directrix: $x = -4$

2) _____

Focus: $(-2, 2)$ F.W.: 4

3) $5y^2 = 16x$

Vertex: $(0, 0)$ Directrix: $x = -4/5$

3) _____

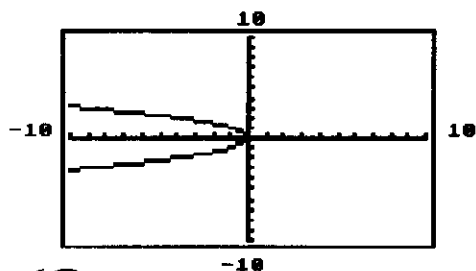
Focus: $(4/5, 0)$ F.W.: $16/5$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find an equation that matches the parabola's graph.

4)

4) A



(A) $x = -y^2$

B) $x = y^2$

C) $y = x^2$

D) $y = -x^2$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the standard form of the equation of the parabola.

5) Vertex at the origin, focus at $(0, 2)$

5) _____

$x^2 = 8y$

6) Focus at $(0, 5)$, directrix $y = -5$

6) _____

$x^2 = 20y$

7) Vertex at the origin, opens to the left, focal width = 12

7) _____

$$y^2 = -12x$$

8) Focus at $(-2, -4)$, vertex $(-4, -4)$

8) _____

$$(y+4)^2 = 8(x+4)$$

9) Focus at $(2, -3)$, directrix $x = 5$

9) _____

$$(y+3)^2 = -6\left(x - \frac{7}{2}\right)$$

10) Vertex at $(2, -1)$, opens upward, focal width = 16

10) _____

$$(x-2)^2 = 16(y+1)$$

11) Vertex at $(2, 3)$, opens to the right, focal width = 5

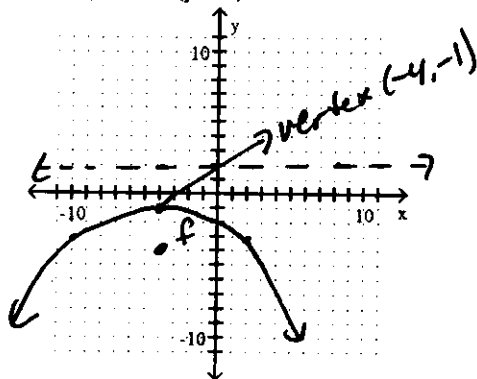
11) _____

$$(y-3)^2 = 5(x-2)$$

Sketch the graph the parabola by hand.

12) $(x+4)^2 = -12(y+1)$

12) _____

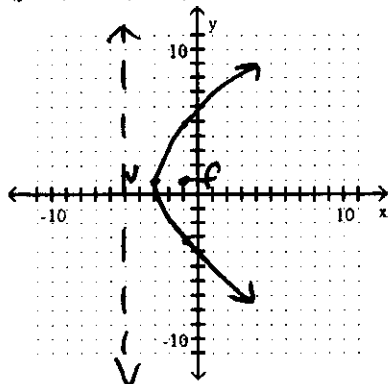


F. w.: 12

focus: $(-4, -4)$

Directrix: $y = 2$

13) $(y-1)^2 = 8(x+3)$



vertex: $(-3, 1)$

focus: $(-1, 1)$

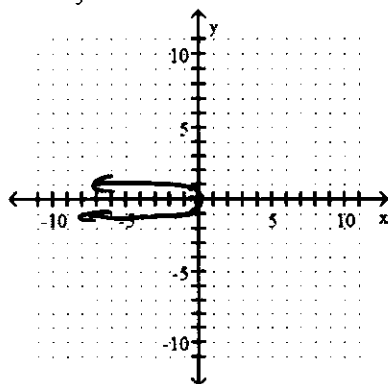
F.w: 8

directrix: $x = -5$

13) _____

Graph the parabola using your calculator. (Remember equations must be solved for y.)

14) $x = -8y^2$



$$\frac{x}{-8} = \frac{-8y^2}{-8}$$

$$y^2 = -\frac{1}{8}x$$

$$4a = \frac{1}{8}$$

$$a = \frac{1}{32}$$

vertex: $(0, 0)$

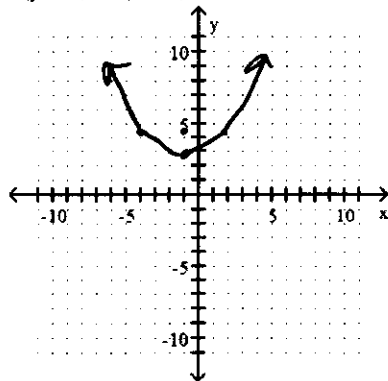
focus: $(0, -\frac{1}{32})$

F.w.: $\frac{1}{8}$

$$y = \pm \sqrt{-\frac{1}{8}x}$$

14) _____

15) $6(y-3) = (x+1)^2$



$$6(y-3) = (x+1)^2$$

$$4a = 6$$

$$a = \frac{6}{4} = \frac{3}{2}$$

vertex: $(-1, 3)$

focus: $(-1, 4\frac{1}{2})$

f.w.: 6

$$y = \frac{(x+1)^2}{6} + 3$$

15) _____

Find the vertex, the focus, and the directrix of the parabola.

16) $x^2 + 2x - y + 3 = 0$

$$\left(\frac{2}{2}\right)^2 = 1 \quad x^2 + 2x + \frac{1}{1} = y - 3 + 1$$

$$(x+1)^2 = y - 2$$

vertex: $(-1, 2)$

focus: $(-1, 9/4)$

directrix: $y = 7/4$

16) _____

17) $y^2 - 4y - 8x + 20 = 0$

$$\left(\frac{-y}{2}\right)^2 = 4 \quad y^2 - 4y + \frac{4}{1} = 8x - 20 + 4$$

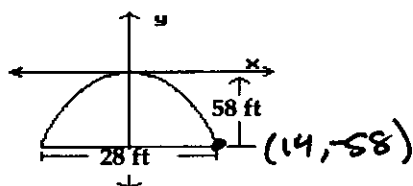
$$(y-2)^2 = 8(x-2)$$

vertex: (2, 2)
focus: (4, 2)
directrix: $x=0$

17) _____

Solve the problem.

18)



18) _____

A building has an entry the shape of a parabolic arch 58 ft high and 28 ft wide at the base. Find an equation for the parabola if the vertex is put at the origin of the coordinate system.

$$x^2 = 4ay$$

$$14^2 = 4a(-58)$$

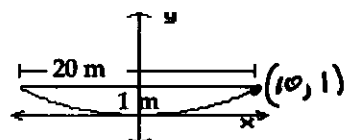
$$\frac{196}{-232} = \frac{-232a}{-232}$$

$$a = \frac{49}{58}$$

$$4a = \frac{98}{29}$$

$$x^2 = -\frac{98}{29}y$$

19)



19) _____

A radio telescope has a parabolic surface. If it is 1 m deep and 20 m wide, how far is the focus from the vertex?

$$x^2 = 4ay$$

$$10^2 = 4a(1)$$

$$100 = 4a$$

$$25 = a$$

25 meters

20) Write an equation for the parabola with vertex (0, 2), a point on the parabola at (-6, -4), and opens to the left.

20) _____

$$(y-2)^2 = 4ax$$

$$(-4-2)^2 = 4a(-6)$$

$$36 = -24a$$

$$-\frac{3}{2} = a$$

$$4a = 4\left(-\frac{3}{2}\right) = -6$$

$$(y-2)^2 = -6x$$